REMARKS/ARGUMENTS

By virtue of this response, claims 11 and 12 have been amended. Claim 11 is amended to recite "a recombinant polypeptide", to correct the antecedent. Claims 11 has also been amended to further define the recombinant polypeptide as an *Anacyctis nidulans* delta-9 desaturase enzyme in operable linkage with an endoplasmic reticulum membrane retention and retrieval signal sequence as defined by SEQ ID NO:3. Support for this amendment can be found for example in claims 1 and 7 as originally filed. Claim 12 has been amended to further define polypeptide as defined by SEQ ID NO:2. Support for this claim can be found, e.g., in claim 5 as originally filed. Accordingly, claims 1-17, 26 and 32 are currently pending in this application.

Specification

Examiner objected to the specification at page 2,line 7, page 14, line 7 and page 22, line 6 for having regions of text that are illegible. The specification has been amended to clarify the text at page 2, line 7, page 14, line 7 and page 22, line 6 as requested by Examiner. Replacement pages 2, 14 and 22 are provided.

Examiner objected to the abstract of the disclosure, alleging that it did not commence on a separate sheet in accordance with 37 CFR 1.52 (b)(4). A replacement sheet setting out the abstract as originally filed is provided.

The specification is further amended at page 3, line 8 to recite: "...56~~7~~89050; 5789220; 6355861..." to correct a typographical error.

In view of the above comments and foregoing amendments, Examiner is respectfully requested to withdraw the objections to the specification.

Claim objections

Examiner objected to claim 11 for reciting "the recombinant polypeptide." In response, claim 11 has been amended to recite "a recombinant polypeptide". In view of the above comments and foregoing amendments, Examiner is respectfully requested to withdraw the objection to claim 11.

Rejection under 35 U.S.C. § 103(a)

Claims 11-17, 26 and 32 are rejected under 35 USC103 (a) as being unpatentable over Martini et al. and Nishizawa et al. The Examiner states that Martin et al. teaches a nucleic acid sequence encoding a heterologous or synthetic delta-9 desaturase from yeast operably linked to an endoplasmic reticulum (ER) retention and retrieval signal sequence, including a sequence having a KKXX motif. The Examiner also alleges that Nishizawa et al. teach a delta-9 desaturase sequence from the prokaryote *Anacystis* for transformation of plants and extraction of oils with reduced saturation of fatty acids. The Examiner therefore asserts that it would have been obvious to one skilled in the art to substitute the delta-9 desaturase coding sequence from *Anacystis* taught by Nishizawa et al. Applicant traverses the rejection.

The present invention, as defined in claim 11, provides for a recombinant polypeptide comprising a prokaryotic delta-9 desaturase enzyme, from *Anacystis nidulans*, in operable linkage with an endoplasmic reticulum retention and retrieval signal sequence KKXX (SEQ ID NO: 3). Applicant submits that neither Martin et al., Nishizawa et al., or the combination of these documents, teach, or leads a skilled worker to, the polypeptide defined in claim 11.

Martin et al. discloses a chimeric fatty acid delta-9 desaturase gene, comprising a plant cytochrome B5 sequence, fused to a fragment of a yeast delta-9 desaturase sequence. On page 14, lines 4-20, Martin et al. describe replacing various regions of plant cytochrome B5, with homologous regions from the yeast delta-9 desaturase. In this way, chimeric genes encoding essential enzymatic domains from one source are linked to elements derived from another source, in order to enhance transcription, mRNA processing, mRNA stability, protein folding and maturation, membrane targeting or retention, or protein stability. Martin et al. further state on page 5, lines 6-8 (Background of the Invention), that "[n]o delta-9 desaturase activity has been identified in the cytoplasm or endoplasmic reticulum of plants".

On page 61, lines 11-21 of Martin a 34 amino acid C-terminus FAD2 desaturase sequence from *Arabidopsis* is compared with a 30 amino acid yeast OLE1 C-terminal sequence. However, there is no teaching that a 4 amino acid fragment comprising the KKXX motif, out of the 34 amino acid sequence, may be used to target a delta 9 desaturase to the ER.

Applicant therefore submits that Martin et al. do not provide any guidance to one of skill in the art that a delta-9 desaturase may be targeted to the ER using the KKXX sequence.

Nishizawa et al. suggest that in higher plants there two separate pathways for lipid biosynthesis, one involving a eukaryote pathway and the other a prokaryote pathway. On page 1004 (column 1 last line and column 2, first 8 lines) they state that:

> "[i]n higher plants, lipid biosynthetic activities are mainly confined to the plastid and endoplasmic reticulum (ER). Within plastids, lipids are synthesized by the "prokaryotic pathway" and ferredoxin is used for fatty acid desaturation. Lipids are also synthesized in the ER by the "eukaryotic pathway" and cytochrome *b*5 is utilized for fatty acid desaturation, as in microsomes of animal cells and yeast. For this reason, expression of a functional *A, nidulans* delta-9 desaturase in higher plants requires that the prokaryotic gene product must be transported to plastids."

Nishizawa et al. clearly directs one of skill in the art to use a targeting sequence that would target a delta 9 desaturase to the plastid for proper processing. On page 1004, second column, they teach a delta-9 desaturase of *Anacystis nidulans*, fused to the transit peptide of pea RuBisCO small subunit for targeting to plastids. There is no teaching or suggestion for the use of endoplasmic reticulum retention signals, nor are polypeptides comprising such sequences described in NIshizawa et al.

Second, as described in the *present* application, an unexpected improvement in the unsaturated fatty acid yield of plants expressing a prokaryotic delta 9 desaturase is observed. Page 11, lines 13-19 of the specification teaches that the activity of a prokaryotic delta-9 desaturase enzyme in a plant can be increased by linking this enzyme operably to a KKXX sequence. As shown in Table 1 (on page 25), expression of this sequence results in a significant reduction in the levels of saturated fatty acids in seed oil produced by the plants.

For these reasons, Applicants submit that the rejections of claims 11-17, 26 and 32 under 35 U.S.C. §103(a) should be withdrawn.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,

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Attachments: Replacement Sheets (Abstract, pps. 2, 14 and 22)
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